

SHPINEL V.S.

Rediations of Iridium¹¹¹, silver¹¹⁰, and Indium¹¹¹. V. S. Shpinel and N. V. Porafontov (Moscow State Univ.) Zvezd. Zapiski, 1 Teoret. Fiz., 21, 1370-83 (1961). The photo-electron spectrum of Ir¹¹¹ was measured by a spectrometer, with a transverse magnetic field with axial symmetry. The energy values obtained for the Ir¹¹¹ γ -rays agree with earlier data obtained on the basis of conversion electrons. The β -spectra and the spectra of the conversion electrons of Ag¹¹⁰ and In¹¹¹ were studied. For In¹¹¹, γ -rays with energies of 553 and 711 e.kv. were observed. The β -spectrum of Ir¹¹¹ was obtained by means of a spectrometer with 2 magnetic lenses. Rmz J. Rovtar Leach

168

BETA SPECTROMETER WITH TWO MAGNETIC LENSES
AND INTERNAL CORRECTING COILS. V. S. Shpinel. Zhur.
Eksp!'. i Teoret. Fiz. 23, 255-6(1952) Feb. (In Russian)

A β -ray spectrometer is sketched, and a curve obtained
therewith of the conversion electrons of 90-hr Nu^{90m} is
presented. The K/L conversion-coefficient ratio was found
to be 2.5 ± 0.5 . (G.Y.)

SHPINEL, V.S.

USSR/Electricity - Ionization Losses

Apr 52

"Measurements of Fluctuations of Ionization Losses
for Electrons in Thin Layers of Substances," V. S.
Shpinel, Moscow State U

"Zhur Eksper i Teoret Fiz" Vol XXII, No 4, pp 421-
424

In a beta-spectrometer curves of distribution of
ionization losses in Al 1.65 and 3.96 mg/sq cm
thick were measured for electrons of energies of
148 and 222 keV. Exptl values of probable losses
agree well with theory, provided correction is
made for longer path due to scattering. However,

21ST25

the obtained distribution is noticeably wider than
in the theoretical curve of Landau. Indebted to
R. I. Moshkins and M. Z. Shtal. Received 21 Jun
51.

21ST25

USSR

Similar conditions in heavy isobaric nuclei. V. S. Shneller
(Moscow State Univ.), *Zhur. Eksppl. i Teorii*, No. 2, 1953, p. 227.
and the excited and ground states of odd-even and even-odd
nuclei. The elements are grouped in pairs with their proton
nos. differing by 2 units ($\Delta Z = 2$). The difference in excita-
tion energies is small in the case of odd neutrons, and in the
case of odd protons it is smaller for the isobar with larger Z ,
showing that a change in the state of neutrons causes little
change in the Coulomb energy of the nucleus. A 1-particle
model is therefore a satisfactory approximation. S. P.

PMZ 8/9/01

USSR/ Nuclear Physics

Card 1/1 Pub. 43 - 3/11

Authors : Shpinel', V. S.

Title : The life span of the first excited state of Li⁷ from observations of the Doppler effect and gamma-ray aberration

Periodical : Izv. AN SSSR. ser. fiz. 18/1, 65-75, Jan-Feb 1954

Abstract : Experiments show that the method based on the measurement of the Doppler effect can be very effective for estimating the life span of excited states of nuclei with $\tau < \sim 10^{-12}$ sec. It was determined that the application of the Doppler effect method is not limited only to the problem of determining the life span of excited states but can also be applied to the study of nuclear collisions for the purpose of explaining the origin of radiation in the range of greater energies. The results obtained by measuring the state of alpha-particles of Po²¹⁰ excited with Li⁷ nuclei are listed. Thirteen references: 4-USSR; 1-German and 8-USA (1935-1952). Table; graphs; drawings.

Institution : The M. V. Lomonosov State University, Moscow

Submitted : December 25, 1953

USSR/Nuclear Physics - Gamma rays of technetium

FD-1495

Card 1/1 : Pub 146-18/20

Author : Shpinel, V. S.

Title : Gamma-rays of Tc⁹⁵ (Letter to the editor)

Periodical : Zhur. eksp. i teor. fiz., 27, 387-388, Sep 1954

Abstract : Attempts to verify experimentally data by H. Medicus (Helv. Phys. Acta 23, 299 (1950)). Tabulates energies of gamma-rays emitted in K-capture by Tc^{95,m} and Tc⁹⁵. Two Swiss and one USSR references.

Institution : Moscow State University

Submitted : May 22, 1954

Shpinel, V. S.

✓ Decay scheme for zirconium-97 and plutonium-97. N. N.
Ulyagin, A. A. Smirkin, N. V. Eremenko, and V. S.
Shpinel (Moscow State Univ., U.S.S.R.). Nuclear Phys.
30, No. 105 (1966/67). - See C.A. 67, 43476. R. W. Fink

Pet - fm

SHPINEL, V. S.

3609

LUMINESCENCE SPECTROMETER INVESTIGATIONS OF
Ir¹⁹² STRONG γ EMISSION. N. N. Delyagin, G. A. Kuznet-
sova, and V. S. Shpinel (Lomonosov Moscow State Univ.).

Izvest. Akad. Nauk S.S.R. Ser. Fiz. 20, 909-12(1956) Aug.

(In Russian)

Measurements were made of Ir¹⁹² γ radiation in the
strongest range of γ transitions. The analysis of relative
transition intensities, the Ir¹⁹² decay scheme, and com-
parison of the experimental data with theoretical formulas
are presented in diagrams and tabulations. (R.V.J.)

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SHPINEL, V. S.

✓ 3610
THE DECAY SCHEME OF Zr^{91} AND Nb^{91} . N. N. Delyagin,
A. A. Sorokin, N. B. Fofontov, and V. S. Shpinel.

(Lomonosov Moscow State Univ.). Izvest. Akad. Nauk
S.S.R. Ser. Fiz. 20, 913-24 (1956) Aug. (In Russian)

During the conference on Nuclear Spectroscopy in 1955, a report was made describing the studies of Zr^{91} and Nb^{91} decay scheme which had been investigated by the method of $\beta-\gamma$ and $\gamma-\gamma$ coincidences. The method permitted the separation of the soft β spectra for Zr^{91} and Nb^{91} from the total β spectra of $Zr^{91} + Nb^{91}$, and revealed the $\gamma-\gamma$ coincidence with the intensity of ~10%. The energy of cascade quanta, evaluated by the absorption method was found to be ~0.7 Mev and >1 Mev. To obtain a more accurate result the work has been repeated and measurements checked on im-

proved apparatus and the results of the work are given.
(R.V.J.)

Shpinel V. S.

3086

STUDIES OF DOUBLE-LENS SPECTROMETERS AND THE
IMPROVEMENT OF ANNULAR FOCUSING. Ya L. Gariev,
K. P. Mitrofanov, and V. S. Shpinel (Moscow, Lomonosov
State Univ., 2nd Research Inst. of Physical) Izvest. Akad.
Nauk S.S.R., Ser. Fiz. 30, 147 (1959) Dec. (In Russian)

Experimental investigations were made of double-lens
spectrometer focusing properties and of the annular fo-
cusing improvement induced by internal correcting coils.
The construction scheme, electron trajectories, and the
effects of the internal coil are shown. (R.V.J.)

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SPINEL', V.S.

CARD 1 / 2

PA - 1585

SUBJECT USSR / PHYSICS
AUTHOR SPINEL', V.S., GROJS, O.S.
TITLE Vertical Focussing in a Spiral- β -Spectrometer.
PERIODICAL Zurn.techn.fis., 26, fasc.10, 2259-2268 (1956)
Issued: 11 / 1956

This work deals with the computation of spatial trajectories in a spiral- β -spectrometer. The character of the magnetic field: If the pole shoes generating the spectrometer field are cylindrical the magnetic field can be approximatively be subdivided into a homogeneous and an inhomogeneous domain. For the existence of a spiralshaped trajectory it is necessary that the magnetic field be reduced more rapidly than $1/r$. The electron is then not able to move steadily along the "boundary orbit" $r = R$. Spatial motion: Next, the motion of the electrons emitted at a certain angle in the direction of the central plane is investigated. The equations are written down. The motion of the electron can then be considered to be a motion in a conservative field of force with the potential U. All possible trajectories of the electron emitted with initial velocity are within one boundary surface. The boundary surface has the shape of a surface of revolution with plane contour. Next, the orbit of the electron on this surface of revolution is dealt with. For the purpose of illustrating the character of focussing in the vertical plane the motion in a field generated by two fictitious charges is investigated. Such a field is analogous to that on which interest is focussed here and which is generated by two cylindrical pole ends. An equation for the boundary contour is hereby

5350. AN INVESTIGATION OF CHAINS OF RADIOACTIVE TRANSITIONS. V.S Sheinov and G.A Kuznetsov

Zh eksper teor fiz Vol 30 No 2 231-42 (1956) In Russian

A spectroscopic investigation of radioactive transitions $\text{Zr}^{94} \rightarrow \text{Nb}^{94} \rightarrow \text{Mo}^{94}$; $\text{Ra}^{227} \rightarrow \text{Tc}^{97}$; $\text{Ru}^{104} \rightarrow \text{Rh}^{106} \rightarrow \text{Pd}^{108}$ and $\text{Ru}^{104} \rightarrow \text{Rh}^{102}$ was carried out by means of a d-spectrometer with two magnetic lenses and a NaI(Tl) scintillation γ -spectrometer. As a whole the results agree with the published decay schemes.

For the first time the $\text{Nb}^{94} \rightarrow \text{Mo}^{94}$ transition with energy 4.5 MeV has been observed. New levels have been found from $\text{Nb}^{94} \rightarrow \text{Nb}^{94}$ source. Some new levels have never been detected from Rh^{104} . Corresponding γ - and β -transitions have been found in odd nuclei differing by two neutrons.

89-8-7/26

VINOGRADOV, A.V., SHPINEL, V.S.

AUTHOR
TITLE
PERIODICAL
ABSTRACT

The Phosphate-Oxyquinoline Separation Method and the Volumetric Determination of Zirconium.
(Fosfatno-oksikhinolinovyy metod otdeleniya i objemnogo opredeleniya tsirkoniya -Russian)
Atomnaya Energiya, 1957, Vol 3, Nr 8, pp 130-134 (U.S.S.R.)

THE newly developed method is based upon the well-known phosphate method for the separation of zirconium and the determination of zirconium as oxichynalate. It is explained for the first time how zirconium oxichynalate is separated from an oxalate-containing solution after the phosphate precipitation was dissolved in oxalic acid. The conditions are given for the separation of zirconium of titanium and thorium from the phosphate precipitation and of niobium and tantalum from the oxichynalate precipitation. By means of this method it is possible to determine small quantities of zirconium (2-5 mg) with an accuracy of up to \pm 2-4%. The following results show the advantages offered by this method:

Weighed-in Zr quantity:Determined Zr quantity:

Separation of zirconium from oxalate-containing solution	3,44 mg	3,42 mg
Separation of zirconium as phosphate with following transformation into oxichylate	1,72 mg	1,71 mg.

Card 1/2

Sh. & P. et al., V. S.

48-12-7/15

AUTHORS:

Parfenova, V. P. , Forafontev, N. V. , Shpinel', V. S.

TITLE:

Investigation of the Ce¹⁴⁴-Decay According to the Method of β - γ -Coincidence (Issledovaniye raspada Ce¹⁴⁴ metodom β - γ -sovpadeniya)

PERIODICAL:

Izvestiya AN SSSR, Seriya Fizicheskaya, 1957, Vol. 21, Nr 12,
pp. 1601 - 1606 (USSR)

ABSTRACT:

The method of the β - γ -coincidence was here employed for determining the β -transitions of small intensity. When this method is employed the partial- β -spectra occur more distinctly, as the β -particles of the Ce¹⁴⁴-transition in the original Pr¹⁴⁴-state, as well as the β -transitions of Pr¹⁴⁴ which render the deciphering of the primary β -spectrum difficult are not recorded in such measurements. The measurements were performed by means of the apparatus, exactly described in references 6 and 7, consisting of a two-lens- β -spectrometer and a luminescence- γ -spectrometer. But some modifications were made: the inner coils were abandoned, according to reference 8 a diaphragm was inserted in the domain of the ring-image, and the light-conductor of plexiglass was replaced by one of polystyrene. It is shown here that the β -spectra of the coincidence with three different ranges of the γ -spectrum are complicated. The β -spectrum ($E_{\beta} = 310$ keV) drops out of these β -spectra. This due to the

Card 1/2

S. A. Savel, V. S.

48-12-6/15

AUTHORS: Mitrofanov, K. P., Sapinev, V. S.

TITLE: Further Investigation of Electron-Focusing in a Two-Lens- β -Spectrometer (Dal'neysheye izuchenije fokusirovki elektronov v dvukhlinzovom β -spektrometre)

PERIODICAL: Izvestiya AN SSSR, Seriya Fizicheskaya, 1957, Vol. 21, Nr 12,
pp. 1607 - 1613 (USSR)

ABSTRACT: The focusing properties of the two-lens- β -spectrometer БМЛ^{-1} with different lens-positions and the influence of the correcting outer coil were investigated by means of an electron-cannon. The method employed here was already earlier used and is described in detail in reference 1. For supplementing that method the construction of the electron-cannon was improved here and an additional movable diaphragm was inserted. The latter permits to modify the size of the angle of flight of electrons α without disturbing the vacuum. The measurement of the displacement of luminous places on the screen in modifications of the focusing current or displacement of the screen gave the possibility of determining the performance characteristics of the spectrometer and to draw the electron-trajectory-diagrams for different lens-positions. It is shown that the spherical aberration is diminished by drawing apart the lenses.

Card 1/3

.. Shpinel', V.S.

AUTHOR:

DELYAGIN, N.N., SHPINEL', V.S.

PA - 2692

TITLE:
PERIODICAL:

On the even Nuclei having the Characteristic 2+ for the second
Excited State. (O chetno-chetnykh yadrakh, imeyushchikh dlya vto-
rogo vozbuздennogo sostoyaniya kharakteristiku 2+, Russian)
Zhurnal Eksperim. i. Teoret. Fiziki, 1957, Vol 32, Nr 2, pp 373-374
(U.S.S.R.)

Reviewed: 6 / 1957

Received: 5 / 1957

ABSTRACT:

As is well known even-even nuclei as a rule have in their ground state the spin 0 and positive parity (characteristic 0+), and in their first excited state they have the spin 2 and positive parity (characteristic 2+). But there is no such general rule for the secondexcited states, where characterists 4+, 2+, and also others are found. If the sequence of the characteristics 0+-2+-4+ (corresponding to the ground state and the first two excited states) can be successfully explained (at least within the domain of highly deformed nuclei), the sequence 0+-2+-2+ cannot be satisfactorily explained at present. It is interesting to investigate the experimental data on the nuclei at present known with such a sequence of characteristics.

Fe^{56} , Zn^{66} , Se^{76} , Kr^{84} , Cd^{110} , Sn^{116} , Te^{122} , Te^{126} , Xe^{126} , Xe^{128} ,

Os^{186} , P^{188} , Pt^{192} , Pt^{194} , Hg^{198} , Hg^{200} .

The nuclei with $Z > 36$ are grouped in close proximity of the

Card 1/2

On the even Nuclei having the Characteristic 2+ PA - 2692
for the secon Excited State.

values Z = 50 and Z = 82 at which the normal proton shells are filled up. Such a distribution of these nuclei may be connected with their deformation. As the parameters of the deformation of these nuclei are not known, $\delta = (\Delta Z + \Delta N)/2$ is taken as relative measure of nuclear deformation. Here ΔZ denotes the absolute value of the difference between the Z of the nucleus and that value of Z which is nearest to it (which corresponds to the filled shell). For all nuclei investigated here $4 \leq \delta \leq 12$ can be applied. This interval probably corresponds to nuclei with average deformation, and excitation is probably vibrationlike. The nes distribution of the intensities of the two competing γ transitions in favor of direct transition with increasing δ can be explained by means of an increase of the contribution made by the component E 2 to a mixed transition with increasing deformation. (1 illustration)

ASSOCIATION: "Moscow State University.

PRESENTED BY:

SUBMITTED:

AVAILABLE: Library of Congress.

Card 2/2

SHPINEL', V. S., Doc Phys-Math Sci -- (diss) "Studies in the
field of β - and γ -spectroscopy." Mos, 1958. 19 pp (Mos State
Univ im M. V. Lomonosov, Sci Res Inst of Nuclear Physics),
100 copies. Bibliography: pp 17-19 (44 titles) (KL, 18-58, 94)

β - beta
 γ - gamma

-1-

AUTHORS:

Delyagin, N. N., Shpinel', V. S.

SOV/48-22-7-20/26

TITLE:

Life of the First Excited State of the Mg²⁴-Nucleus
(Vremya zhizni pervogo vozbuздennogo sostoyaniya yadra Mg²⁴.)

PERIODICAL:

Izvestiya Akademii nauk SSSR, Seriya fizicheskaya, 1958, Vol.
22, Nr 7, pp. 861-866 (USSR)

ABSTRACT:

The life of the first excited state (1,37 MeV) of the Mg²⁴-nucleus was measured by means of the resonance scattering of ν -quanta. A source of gaseous Na²⁴ was used. At first the theory underlying this method is exposed. In order to increase the energy of the incident quanta up to the resonance level the method of cascade transitions (Ref 8) was used. Formula (3) : $v > E_0/Mc$ gives the condition the quanta must comply with, if they are to have an energy sufficient for a resonance excitation. (E_0 denotes the quantum energy, and M the nuclear mass). The computation of the effective cross-section leads to the computation of the micro-spectrum of the incident quanta as represented by the function $f(E)$. In the decay scheme of

Card 1/3

SOV/48-22-7-20/26

Life of the First Excited State of the Mg²⁴-Nucleus

Na²⁴ → Mg²⁴ the quantum with 1,37 MeV is preceded by a quantum 2,75 MeV and by a β-radiation with a maximum energy of 1,39 MeV. Thus the condition (3) is superfulfilled. The indeterminacy introduced by the selection of a variant of the theory of β-decay is taken into account in the computation of the effective cross-section of resonance scattering according to formula (4),

which gives formula (5): $\sigma = \frac{(1,93 \pm 0,04) \cdot 10^{-38}}{\tau}$, τ denoting the life of the 1,37 MeV state of the Mg²⁴-nucleus. The influence of the state of aggregation of the source substance is examined. It appears that the above results only hold, when the recoil nuclei have a sufficiently long time of free flight. This is achieved by using a gaseous source. The experimental procedure is described. The scattered γ-quanta are recorded by a NaJ(Tl)-crystal and a photomultiplier. The pulses coming from the latter are amplified and then led into a differential discriminator. The resonance scattering of the γ-quanta was measured at five different temperatures of the source ranging from 800 to 880°. The counting rate of the scattered quanta at 860° amounted to 22 pulses per minute on an average, which

Card 2/3

AUTHORS: Gnedich, A. V., Kryukova, L. N., SOV/48-22-7-21/26
Murav'yeva, V. V., Shpinei', V. S., Shunshurov, V. I.

TITLE: On the Problem of Doppler Broadening of Lines of Conversion
Electrons Emitted by Recoil Nuclei (K voprosu o dopplerovskom
ushirenii liniy konversionnykh elektronov, ispuskayemykh yadrami
otdachi)

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya fizicheskaya, 1958,
Vol. 22, Nr 7, pp. 867 - 870 (USSR)

ABSTRACT: When Bi²¹² (ThC) decays by an emission of an α -particle to Tl²⁰⁸ (ThC'), this Tl nucleus exhibits a transition from an excited state with 40 keV to the ground state. The Doppler effect exhibited by these conversion lines is investigated. At first a plane source of infinite extension is investigated. The thickness of the slab exerts a considerable influence on the conversion lines. The shape of the conversion lines was investigated with a helical focusing- β -spectrometer. An active thorium deposit served as a source. The theoretical shape of the lines was computed under the assumption, that the mean life τ of the level of 40 keV is within the range $T < \tau < t$. (τ denotes the life of the excited state, and T the slowing-down period of the

Card 1/3

On the Problem of Doppler Broadening of Lines of
Conversion Electrons Emitted by Recoil Nuclei

SOV/48-22-7-21/26

nuclei in the target). The Doppler effect leads to a broadening of the lines towards high energies. The experimentally obtained B-line well agrees with the theoretical one. This broadening of lines towards high energies was also found with Δ lines (L_{II} of the same transition, $E_e = 25$ keV). The authors checked whether this effect could be caused by distortions of line shape due to the apparatus. The observed broadening of the B- and Aa- conversion lines is actually caused by the Doppler effect. As a summary it is stated that the investigation of the line shape of conversion electrons (emitted from moving nuclei) permits to estimate the life τ of the corresponding levels of the nucleus. The analysis of the line shape must take into consideration the actual experimental condition and in particular the thickness of the source. The life can also be estimated by determining the reduction of intensity of the lines due to the emission of recoil nuclei from the source, if the thickness of the source is known. The analysis of the line shape of the conversion spectrum of moving nuclei is also necessary in the estimation of the relative intensities of the conversion lines. There are 5

Card 2/3

On the Problem of Doppler Broadening of Lines of
Conversion Electrons Emitted by Recoil Nuclei

SOV/48-22-7-21/26

figures and 9 references, 4 of which are Soviet.

ASSOCIATION: Moskovskiy gos. universitet im.M.V.Lomonosova (Moscow State
University imeni M.V.Lomonosov)

Card 3/3

AUTHOR: Shpinel', V. S.

SOV/48-22-8-17/20

TITLE: Level Displacements and the Probabilities of Corresponding
β-and γ-Transitions in Odd Nuclei (Smeshcheniye urovney i
veroyatnosti sootvetstvennykh β- i γ-perekhodov v nechetnykh
yadrakh)PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya fizicheskaya, 1958, Vol.
22, Nr 8, pp. 995 - 1001 (USSR)ABSTRACT: In this paper the author analysed and classified the experimental
evidence available on the excited states of odd nuclei. Similar
problems were already discussed in the papers given by re-
ferences 1-4. Proceeding from the model of independent particles
it could be expected that nuclei with an equal number of odd
particles above the closed shell exhibit similar state spectra.
Such nuclei either have an even number of neutrons or an even
number of protons. The distances between the levels and the
properties of the even nucleon group vary as the number of
pairs in the even nucleon group. It appeared to be of interest
to explain the character of these modifications. The diagrams
(Figs 1-6) permit to draw the following conclusion: The dis-
Card 1/4

SOV/48-22-8-17/20

Level Displacements and the Probabilities of Corresponding β^- and γ^-
Transitions in Odd Nuclei

placement curves are slightly curved and they change their direction when the levels filled up by the even particles are changed. This property can be used to determine the order of filling-up of the levels in the nucleus. The evidence furnished by the investigation primarily showed that the model of independent particles is an absolutely reasonable approximation even in the consideration of such special problems as the level displacement. The deviation of the displacement curves from a linear function can be considered to be due to the modification of the interaction energy of the odd particles with a proton pair when the number of particles in the core of the nucleus is changed. In other words, this interaction energy in the general case depends on the potential well in which the interacting particles are located. If the deviations in the wave functions vary continuously from one nucleus to another as can be assumed according to the shape of the displacement curves, also the matrix elements of the γ^- -transitions must modify continuously. Figures 7 and 8 show that the curves plotted according to the experimental points exhibit the

Card 2/4

SOV/48-22-8-17/20

Level Displacements and the Probabilities of Corresponding β - and γ -
Transitions in Odd Nuclei

expected continuous course in cases where also the corresponding displacement curves have a continuous course. It is known that matrix elements of certain multipoles exhibit a considerable fluctuation for various nuclei. The fluctuations of the matrix elements of the M4-transitions are comparatively small. Continuous modifications of the wave functions of the states must also appear in the probability of the corresponding β -transitions. The probabilities of the β -transitions are dependent on the wave functions of the initial states of a nucleus and on the wave function of the final state in the other nucleus. The curves of $lg \tau_f$ versus the even number of neutrons for corresponding β -transitions (Fig 10) show that the probabilities of the corresponding β -transitions in most cases do not vary greatly and apparently in a continuous manner.

There are 10 figures and 7 references, 3 of which are Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy institut yadernoy fiziki Moskovskogo
gos. universiteta im. M. V. Lomonosova (Scientific Research
Card 3/4

SOV/48-22-8-17/20

Level Displacements and the Probabilities of Corresponding β^- and γ^- Transitions in Odd Nuclei

Institute of Nuclear Physics at the Moscow State University
imeni M. V. Lomonosov)

Card 4/4

NOPIN, Ye V.

507/53-65-4-7/15

AUTHOR:

Varashovitch, D.
The VIII Annual Congress of Nuclear Spectroscopy (VIII
reshodnoye sovershchaniye po yadernoy spektralopki). ITITLE:
Uspishi fizicheskikh nauk, 1958, Vol. 65, No. 4,
pp. 721 - 722 (USSR)

PERIODICAL:

ABSTRACT:
The 8th Congress of Nuclear Spectroscopy took place in
Leningrad from January 27 to February 3, 1958. It was
attended by 300 scientists from the USSR, further by scientists
from China, France, Poland, Czechoslovakia, Hungary, East Germany,
Yugoslavia, and the Non-Communist Democratic Republics. 4
main lectures and about 90 reports were heard. The main
lectures dealt with problems concerning nuclear models, the
theory of nuclear interaction, and nuclear
isotropies. D.S. Dubalevsky, Corresponding Member of the Academy of
Sciences, USSR, opened the conference. Lectures were held
by V.Yu. Gorchak, Ye. V. Inopin, S.P. Kapitza (Pr. 15 DRSRR)
on light nuclei and generalized nuclear models; K.K. Peker
(AM SSSR Library, Moscow) on the Leningrad Physical-Techanical
Institute; L.A. Sil'ev (IPT-Leningrad Physical-Techical
Institute) at al. on levels in Mg^{24} , Mg^{25} and Al^{27} ; D.G.
Akhiezer, A.P. Grinberg, G.M. Guzenitsky, K.I. Tereshina and
I.K. Leesberg (IPT) on and in neutron levels
at 1 MeV in Cr , In , and In nuclei. The same research works
also reported on the discovery of vibrational F -levels
in Fe^{52} , W^{64} , W^{68} nuclei by means of the method of the
coupled (Eilen) excitation at E ~ 1 MeV. I.K. Peker
(IPT SSSR) gave a survey report: "Condensing Some Particulars
in Vibrational Levels of Deformed Nuclei". Lectures were
held also by D.P. Kuretsky (AM SSSR - Acpuss) on radiation
transitions in deformed nuclei with the spin $\frac{1}{2}$; V.S.
Shpindel, 2 MFTU (2nd Scientific Research Institute of
Tsvetnoy Moscow State University) on the level displacement
and the probability of corresponding β^- and δ^- transitions
in odd nuclei; D.P. Zaretsky (AM SSSR - AM USSR) on the
influence of the spin-orbital coupling upon the magnetic
moments of the nuclei; A.I. Bas' (AM SSSR - AM USSR) on the
existence of light nuclei with high neutron or proton excesses;
V.A. Kravets (Ural Polytechnic Institute) on the
formation of neutron pairs in nuclei; L.L. Goldin, A.D.
Pilyay, G.I. Novikova, K.A. Tsvetkov (IPT, AM SSSR),
on alpha decay on rotational levels of odd nuclei; F.O.
Rosen (AM SSSR - AM USSR) on alpha decay of nonspin-polarized
nuclei (survey); A.I. Al'kinov, V.V. Yeliseyev, V.V. Zubakov,
V.V. Vashkevich (IPT, AM SSSR) on polarization measurements,
at electrons emitted in the β -decay of Ta^{181} , Ta^{177} , Ag^{190} ,
 Sr^{88} , B^{10} ($AZ = 0^{\pm}, \Delta = \pm \frac{1}{2}$) as well as in that of Be^{90} and Y^{90}
(A.I. Al'kinov, V.V. Yeliseyev, V.V. Zubakov (AM SSSR - AM USSR)) on measure-
ments of the $(p\gamma)$ angular correlations in Be^{90} decay;
K.I. Zhurav'ev and Yu. Tsvetkov (IPT, AM SSSR) on investigations
of the electron-neutron correlations and the resonance
scattering of γ -radiation; B.K. Kiraiov and I.M. Radzhabov
(MFTU State University) on the bremsstrahlung of
longitudinally polarized electrons; A.I. Mekhtarov and Yu.S.
Perv (IPT) on the effective cross section of scattering
of polarized electrons and positrons (flight) on the determination of
the intensity of the components of the Coulomb p -spectrum
according to the Fermi diagram; I.I. Band, L.E. Myranova, and
Yu.P. Butler, IGD (Leningrad State University) on the com-
putation of the probability of the permitted and of the
forbidden capture of electrons by a nucleus.

SOV/20-121-4-13/54

21(7)
AUTHCRS: Delyagin, N. N., Shpinel', V. S.TITLE: The Resonance Scattering of Gamma-Quanta on Nuclei of Mg²⁴
(Rezonansnoye rasseyaniye gamma-kvantov na yadrakh Mg²⁴)PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 121, Nr 4, pp 621-622
(USSR)ABSTRACT: This paper investigates the resonance scattering of γ -quanta (which were generated by the decay Na²⁴ \rightarrow Mg²⁴) on Mg²⁴ nuclei in order to measure the life of the first excited state (with the energy 1,37 MeV) of the Mg²⁴ nucleus. In the emission and in the absorption, a part of the energy of the quantum is spent for the recoil of the nuclei. This energy loss is relatively low, but it is much higher than the width of the excited level. In order to bring about the resonance scattering, the energy of the quanta must be restored to the former value of the resonance energy. In the investigated case such a completion occurs because of a β - γ cascade (which preceded the emission of a quantum of 1,37 MeV) in the decay

Card 1/3

SOV/20-121-4-13/54

The Resonance Scattering of Gamma-Quanta on Nuclei of Mg²⁴

scheme of Na²⁴. After the emission of the β-particle and of the first γ-quantum, (275 MeV), the excited nucleus Na²⁴ begins to move, and the quantum of 137 MeV is emitted already by the moving nucleus. Therefore the energy of the quantum is changed according to Doppler's law. Therefore, the energy is recompleted for a certain part of the γ-quanta. For putting this mechanism into operation the free length of path of the recoil nuclei must be sufficiently high. This condition is satisfied only in a gaseous source, and therefore the author used vapors of radioactive sodium as a source. An explicit formula is given for the cross section of the resonance scattering. The form of the micro-spectrum will depend on the variant of the theory of the β-decay. There is a certain indefiniteness (only a few per cents) in the calculation of the cross section since this variant is not known. A diagram demonstrates the microspectrum of the incident quanta for the scalar variant of the theory of the β-decay. The width (and therefore also the life) of the level is found by a comparison of the measured cross section with the calculated one. The measuring apparatus was described in a previous paper. The resonance effect was intensified by

Card 2/3

SOV/20-121-4-13/54

The Resonance Scattering of Gamma-Quanta on Nuclei of Mg²⁴

an increase of the temperature. The measured dependence of the effect on the temperature agrees correctly with the theoretically calculated dependence. The measured cross section of the resonance scattering was equal to $(1,14 \pm 0,23) \cdot 10^{-26}$ cm² and this gives the value $\tau = (1,7 \pm 0,4) \cdot 10^{-24}$ sec for the lifetime of the excited (1,57 MeV) state of Mg²⁴. For the quadrupole moment and the deformation parameter the values 0,7 barn and $\beta = 0,59$ were found. There are 1 figure and 5 references, 2 of which are Soviet.

PRESENTED: March 18, 1958, by D. V. Skobel'tsyn, Academician

SUBMITTED: March 11, 1958

Card 3/3

85859

S/048/59/023/012/003/009
B006/B060

24.6810
AUTHORS: Bedesku, A., Mitrofanov, K. P., Sorokin, A. A., Shpinel', V.S.

TITLE: Investigation of the Te¹³¹ Decay Scheme ($T_{1/2} = 30$ Hours)PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959,
Vol. 23, No. 12, pp. 1434 - 1444

TEXT: The knowledge, how far the neutron levels $3s_{1/2}$, $1h_{11/2}$, and $2d_{3/2}$ are occupied in a number of iodine isotopes, plays an important part in nuclear shell theory. According to it the authors investigated thoroughly the decay scheme of $^{52}_{53}\text{Te}^{131}_{78}$, of which β -decay excites the levels of the isotope $^{79}_{77}\text{I}^{131}$. The specimen was prepared by bombardment of highly purified metallic Te with thermal neutrons. For ^{130}Te , occurring with an abundance of 34.49% in the natural isotopic mixture, a (n,γ) -reaction was initiated producing simultaneously two ^{131}Te isomers: one with a half-life of 30 h (activation cross-section < 8 mb) and another with a half-life of

Card 1/4

Investigation of the Te¹³¹ Decay Scheme
(T_{1/2} = 30 Hours)

85859
S/048/59/023/012/003/009
B006/B060

25 min (0.22 b). After the establishment of an equilibrium between both isomers and after the total decay of the 25 min - Te¹³¹ created directly by the (n,γ) process, the specimen was dissolved in concentrated nitric acid. The J¹³¹, created by Te¹³¹ decay, was extracted by carbon tetrachloride. Tellurium dioxide served as source with low specific activity due to the small activation cross-section of the 30 h - Te¹³¹. The γ-spectrum of this specimen purified of iodine, was measured by a scintillation γ-spectrometer. The measurements took several days because the contribution of the long-lived Te-isotopes and of other impurities had to be estimated. Fig. 1 shows a section of the Te¹³¹-spectrum (energy range 500 - 1,400 kev) and Fig. 2 shows the same for the range of 700 - 2,400 kev. Data on the relative intensities of the lines are shown in Table 1 (related to the intensity of the 780 kev line - 100). Transitions with 2.2 and 1.85 Mev were found, and instead of the 1.15 Mev transition (Ref. 6) two with 1.12 and 1.20 Mev were found. A telescope with smaller solid angle was applied to the investigation of the hard region of the spectrum, and the transitions with 1.6, 1.85, and 2.2 Mev

Card 2/4

85859

Investigation of the Te¹³¹ Decay Scheme
(T_{1/2} = 30 Hours)

S/048/59/023/012/003/009
B006/B060

were found to correspond to transitions and do not occur by superpositions. Fig. 3 shows the spectrum of the conversion electrons in the range of 600 - 1,300 kev, the L- and K-photopeaks corresponding to γ -transitions with 780, 850, 925, 1140, and 1220 kev. Further the β - γ - and the γ - γ -coincidence spectra were investigated. Fig. 4 shows the block diagram of the equipment applied to the measurement of the so-called "summing coincidences". The spectrum of γ -rays accompanied by β -particles is shown in Fig. 5 for E _{β} > 1 Mev and in Fig. 6 for E _{β} > 1.4 Mev. The best noticeable

peak is at 147 kev; it is assumed that this peak corresponds to the first excited level of J¹³¹. Further details of the γ - β -coincidence spectrum are to be seen in Figs. 7 and 8. Figs. 9, 10, and 11 show the weak part of the γ -spectrum in coincidence with 780 kev γ -rays, the spectrum of the "summing coincidences" (E_{sum} = 770 kev) and the part of the electron con-

version spectrum of Te¹³¹ with the 780 and 850 kev lines. The 780 kev transition ends in the ground state of ⁵³J¹³¹₇₈. For both these aforementioned lines the multipolarities E1 and E2 are assumed, and the internal

Card 3/4

Investigation of the Te¹³¹ Decay Scheme
(T_{1/2} = 30 Hours)

85059

S/048/59/023/012/003/009
B006/B060

conversion coefficients for these lines are given (theoretical and experimental data) in Table 2. Finally particulars with reference to the proposed decay scheme (Fig. 12) and the complete results of investigations are discussed. According to the shell model ^{1g}_{7/2} is regarded as the ground state and ^{2d}_{5/2} as the first excited level (147 kev). Fig. 13 illustrates the level distance ^{2d}_{5/2} - ^{1g}_{7/2} for different iodine isotopes as a function of the even neutron number. The authors thank Yu. M. Ukrainskiy, N. P. Rudenko, O. M. Kalinkina, as well as L.P. Sorokina and V. V. Skvortsov, students of the Physics Department of Moscow State University, for their assistance. There are 13 figures, 2 tables, and 24 references: 4 Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy institut yadernoy fiziki
Moskovskogo gos. universiteta im. M. V. Lomonosova (Sci-
tific Research Institute of Nuclear Physics of the Moscow
State University imeni M. V. Lomonosov)

Card 4/4

5(2)
AUTHORS:

Vinogradov, A. V., Shpinel', V. S.

SOV/32-25-9-12/53

TITLE: On the Determination of Zirconium in the Presence of Niobium and
Tantalum According to the Phosphate- and Hydroxyquinoline Methods

PERIODICAL: Zavodskaya laboratoriya, 1959, Vol 25, Nr 9, pp 1067-1068 (USSR)

ABSTRACT:

A method for the precipitation of zirconium in form of its hydroxyquinoline (I) in the presence of Nb and Ta in a strongly ammoniacal medium and a subsequent volumetric determination were described in a previous paper (Ref 3). In the present case the behavior of Nb and Ta in the Zr precipitate as a phosphate (II) or (I) was tested with the aid of radioactive isotopes. The already known conclusion that without H_2O_2 (III), Nb and Ta are completely coprecipitated with (II) was confirmed. The presence of (III) which little influences the coprecipitation of Ta, obstructs, however, the coprecipitation of Nb (Tables 1, 2); however, only with small Zr quantities and individual precipitation of Zr (without Nb) may be expected. It was already reported (Ref 3), that 2.88 mg Zr in the presence of 8 - 18 mg Nb and 25 mg Ta may be determined by a precipitation as (I). With a

Card 1/2

On the Determination of Zirconium in the Presence of SOV/32-25-9-12/53
Niobium and Tantalum According to the Phosphate- and Hydroxyquinoline Methods

pH 10.7 - 11.5 Nb does not influence the determination, nor does the partially coprecipitated Ta disturb the Zr determination (Tables 3-5). The investigations led to the following conclusions: In the (II)-precipitation along with (III) a partial coprecipitation of Ta occurs. The gross of Nb remains in solution. The larger the coprecipitated Nb quantity is, the larger is the precipitated Zr quantity, so that (as mentioned above) a separation is only possible with negligible quantities of Zr and Nb. The application of a successive precipitation with (II) and then (I) permits a complete separation of small quantities of Zr (2.88 mg) from Ta and Nb (Ref 3). With larger quantities a repeated precipitation of zirconium as (I) could possibly render satisfying results. Also referred to are other possibilities for Zr separation, as i.e. by extraction (Ref 3). There are 5 tables and 4 Soviet references.

Card 2/2

S/048/EO/C21.215/203/01
RG19/B055

AUTHORS: Sazonkin, A. A.; Budzuk, A. M.; El'yanovskaya, N. V.
Averbukh, I. I.; Matrosov, V. P.; Mironov, V. P.
Byakov, V. N.; Chinnik, G. G.

TITLE: Study of the Decay of Te^{118} and Te^{119} and the Level Scheme
of Sb^{119}

PERIODICAL: Izv. Akademi nauk SSSR Seriya fizicheskaya, 1960,
Vol. 26, No. 2, pp. 426-431

TEXT: The present paper was read at the 15th All-Union Conference on
Nuclear Spectroscopy, which was held in Moscow on January 11-15
January 27, 1960. The neutron-irradiated isotopes were obtained
by a one and a half hours irradiation with CO_2Mo bricks at 0.75 MeV
(Joint Institute of Nuclear Research). The tellurium was chemically
separated 1-2 days after irradiation. The measurement of the γ -spectrum
and the β - γ coincidences were carried out by means of a scintillation
spectrometer. The β - γ coincidences were measured by means of a β -scintilla-

Card 1/4

tion meter, which was connected with a coincidence circuit with a γ -spectrometer.
The β -spectrum of Te^{118} consists essentially of a component with the quart
edge at 2100 \pm 50 kev. As shown in the text, this β -spectrum is
furnished by the isotope Sb^{118} , which is in equilibrium with Te^{118} . On
the basis of these results, the authors assume that the Sb^{118} and Te^{118}
decay entirely into the ground state of the daughter nuclei. For the ground
state of Sb^{118} , 0°, and for the initial state of Sb^{118} , 0° or 90° is given.

6.1 \pm 0.1 days are given as the half-life of Te^{118} . From investigations
carried out with the scintillation- γ -spectrometer, in which Sb^{118} , Te^{118}
and Te^{120} were detected, the authors are able to state that all of trans-
itions having a half-life of 4.75 days are related to the decay of Te^{119} .
They are transitions between the Sb^{119} levels. From a thorough study of
these lines and the angular correlation of the γ -radiation, the authors
were able to set up the decay scheme of Te^{119} shown in Fig. 4. Finally,

Card 2/4

the authors deal with the Te^{119} isomers. They arrive at the conclusion
that the isomer of Te^{119} with a half-life of 4.75 days is associated
isomeric state with the spin $11/2$ and that the cause of its
half-life of 12 hours is in the ground state. The authors thank T. N. Yudkina
for producing the source, and L. Vasil'ev, B. I. Koritsaeva,
T. G. Zinchenko, students of Physics and
engineering students for carrying out measurements and
evaluating experimental results. There are 10 figures and 14 references.

S/048/EO/024/012/009/011
RG19/3056

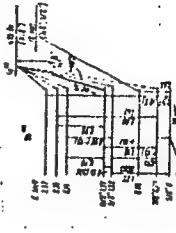


Fig. 4. Decay scheme of Te^{119} .
Open circles indicate unmeasured transitions.

21 (8)
AUTHORS:

Bedesku, A., Mitrofanov, K. P.,
Sorokin, A. A., Shpinel', V. S.

SOV/56-37-1-55/64

TITLE:

The Decay of Te¹³¹ ($T_{1/2} = 30$ hours) (Raspad Te¹³¹ ($T_{1/2} = 30$ chas))

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37,
Nr 1, pp 314 - 315 (USSR)

ABSTRACT: Te¹³¹-decay has already been investigated in a number of papers, and in reference 3 also a decay scheme, basing upon the energy equilibrium in β - and γ -transitions was published. The authors of the present "Letter to the Editor" have set up an exact scheme of the lower levels of J¹³¹ (excited in the decay of the isomer Te¹³¹) for which purpose a number of new data concerning the γ -transitions in Te¹³¹ were used. The investigations were carried out in a magnetic lens spectrometer and a scintillation spectrometer connected in coincidence. The Te¹³¹-source was obtained by the irradiation of metallic tellurium of high chemical purity by slow neutrons. The measured γ -intensities at the en-

Card 1/3

SOV/56-37-1-55/64

The Decay of Te¹³¹ ($T_{1/2} = 30$ hours)

ergies 780, 850, 925, 1140, 1220, 1600, 1850 and 2200 kev amounted to 100, 40, 15, 35, 25, 5, 2, 0.5 % in the same order. The transitions 80, 100, 147, 240, 330, 440 and 590 kev were found both in single spectra and in the spectra of $\beta\gamma$ - and $\gamma\gamma$ -coincidences; (147 kev - first excited state of J¹³¹, 780 kev ground state). Table 2 shows the results obtained by determining the conversion coefficients onto the K-shell:

$E\gamma$ [kev]	$a_k^{\text{exp}} \cdot 10^3$	E1	E2	M1	Identification
780	0.8 ± 0.2	0.84	2.3	3.0	E1
850	1.6 ± 0.6	0.71	1.9	2.5	E2 (+ M1)
147	260 ± 50	-	330	220	M1 + E2

The life-time of the 147 kev level was determined as amounting to $T_{1/2} = (8 \pm 1) \cdot 10^{-10}$ sec., which is in good agreement with reference 5. The decay scheme of Te¹³¹ found by the authors is

Card 2/3

SOV/56-37-1-55/64

The Decay of Te¹³¹ ($T_{1/2} = 30$ hours)

shown by a figure. There are 1 figure, 2 tables, and 6 references, 1 of which is Soviet.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute of Nuclear Physics of Moscow State University)

SUBMITTED: April 8, 1959

Card 3/3

82612

The Hyperfine Structure of γ -Rays, Produced
by Quadrupole Interaction in the Crystal
Lattice

S/056/60/039/001/028/029
B006/B063

✓

underwent linear acceleration within certain limits. Measurements were carried out at the temperatures of liquid nitrogen. The X-radiation of tin (26 kev) was almost completely absorbed by a palladium film 0.06 mm thick. The γ -quanta passing through this filter were recorded by means of an NaI(Tl) crystal. The pulses coming from the single-channel pulse-height analyzer were linearly phase-modulated in a radio device, viz. simultaneously with the changes in the source velocity. The modulated pulses were fed into a 100-channel pulse-height analyzer of the type AN-100 (AI-100). Each channel corresponded to a certain velocity of the source. The measurements were made with two absorbers containing Sn¹¹⁹, namely, metallic tin and SnNb₃ alloy. The dependence of resonance absorption on the velocity of the source for a tin specimen 20 mg/cm² thick is shown in the upper part of the Fig. on p. 221. The curve has three peaks at 0 and ± 1.46 mm/sec (velocity of the source). This corresponds to a hyperfine structure of the 23.8-kev level, and is explained by the interaction between the quadrupole moment of the nucleus in the excited state (spin 3/2) and the electric field of the crystal.

Card 2/3

84972

S/056/60/039/003/058/058/XX
B006/B070

24.6210

AUTHORS:

Delyagin, N. N., Shpinel', V. S., Bryukhanov, V. A.,
Zvenglinskiy, B.

TITLE:

Nuclear Zeeman Effect in Sn¹¹⁹

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960,
Vol. 39, No. 3(9), pp. 894 - 895

TEXT: The present "Letter to the Editor" is the continuation of a previous paper (Ref.4) in which the authors reported on measurements of the dependence of resonance absorption of 23.8-kev gamma quanta emitted in the Sn^{119m} decay on the velocity of the source relative to the absorber. The authors have again carried out analogous measurements, but this time the absorber was placed in an external constant magnetic field. In this case, a Zeeman splitting of the absorption line took place, and a hyperfine splitting was observed in the spectrum, from which the magnetic moment of the excited 23.8 kev level of Sn¹¹⁹ could be determined. The

Card 1/4

84972

Nuclear Zeeman Effect in Sn¹¹⁹S/056/60/039/003/058/058/XX
B006/B070

gamma source was a foil of white metallic tin (94% of Sn¹¹⁸) exposed to thermal neutron irradiation in a reactor. The absorber was SnNb₃ in which no quadrupole splitting of the 23.8 kev level takes place according to Ref. 4. Thus, the observed hyperfine splitting of the absorption line is only a consequence of the Zeeman effect. For the measurements, the source and the absorber were cooled to nitrogen temperature. The absorber (20 mg/cm² SnNb₃) was placed between the pole pieces of a magnet producing a constant magnetic field of 12,150 oe in the absorber, and the measurements were made with and without a magnetic field. The ground level is split in two and the excited one (3/2) in four sub-levels under the action of the field. 6 M₁ transitions are possible between these. By changing the velocity of the source (positive and negative velocity) 12 lines must be observable. The shape of the absorption spectrum is dependent on the magnetic moments |μ₀| and |μ| of the ground and excited states of the Sn¹¹⁹ nucleus; on the relative signs of these moments; and on the quadrupole splitting Δ of the excited state. The results of the measurements are represented in a diagram

X

Card 2/4

8497

Nuclear Zeeman Effect in Sn¹¹⁹S/056/60/039/003/058/058/xx
B006/B070

(ordinate : counting rate; abscissa : velocity of the source and the corresponding energy shift). The distance between the hyperfine structure components was determined from the spectral measurement to be

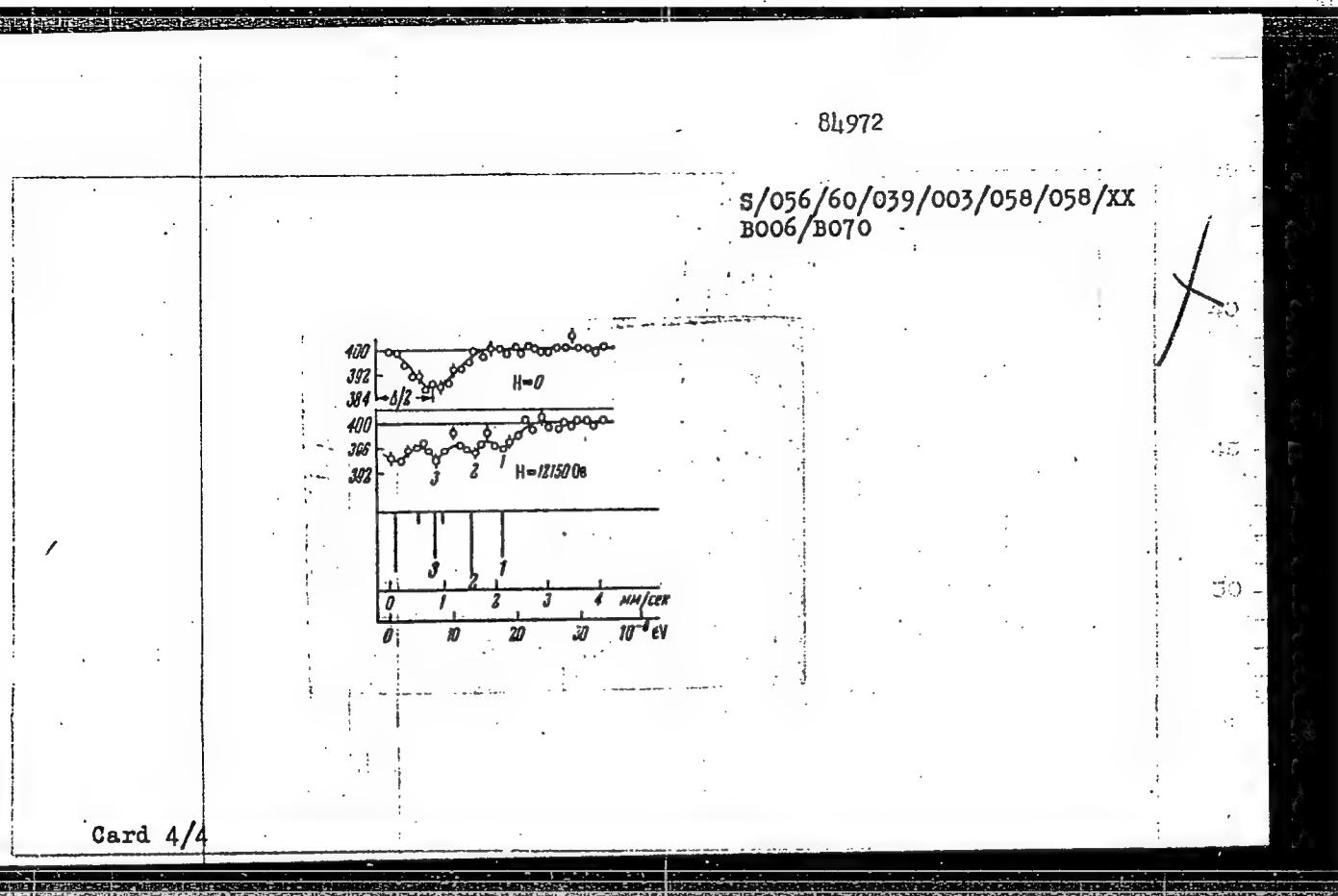
$\Delta = (1.2 \pm 0.2) \cdot 10^{-7}$ ev. This is in good agreement with the value obtained in Ref. 4. From the positions of the three maxima, μ_0 was found to be $-(1.1 \pm 0.3)$ nuclear magnetons and the moment of the 23.8 kev level to be $\mu = + (1.9 \pm 0.4)$ nuclear magnetons. This value is considerably higher than that given by the single-particle model. A. I. Alikhanov and V. A. Lyubimov are mentioned. There are 1 figure and 5 references:

3 Soviet, 1 German, and 1 French.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: July 4, 1960

Card 3/4



VINOGRADOV, A.V.; SHPINEL', V.S.

Composition and properties of zirconium hydroxyquinolinate obtained
from an oxalate medium. Zhur.neorg.khim. 6 no.6:1338-1341 Je
'61. (MIRA 14:11)
(Zirconium compounds) (Quinoline)

STRIGACHEV, A.T.; NOVIKOV, L.S.; SOROKIN, A.A.; KHALKIN, V.A.; TSVETKOVA,
N.V.; SHPINEL', V.S.

Investigating neutron-deficient Tb isotopes. Izv. AN SSSR. Ser.
fiz. 25 no.7:813-825 Jl '61. (MIRA 14:7)

1. Nauchno-issledovatel'skiy institut yadernoy fiziki Moskovskogo
gosudarstvennogo universiteta im. M.V. Lomonosova i Ob "yedinennyi
institut yadernykh issledovaniy.

(Terbium--Isotopes)

BEDESKU, A.; KALINKINA, O.M.; SOROKIN, A.A.; FORAFONTOV, N.V.;
SHPINEL', V.S.

Decay scheme of Te^{131m}. Zhur. eksp. i teor. fiz. 40 no.1:91-100
Ja '61. (MIRA 14:6)

1. Institut yadernoy fiziki Moskovskogo gosudarstvennogo
universiteta.
(Tellurium-Decay)

BRYUKHANOV, V.A.; DELYAGIN, N.N.; ZVENGLINSKIY, B.; SHPINEL', V.S.

Energy shift of gamma-ray transition observed in the
resonance absorbtion of γ -quanta in crystals. Zhur.
eksp. i teor. fiz. 40 no.2:713-714 F '61. (MIRA 14:7)

1. Institut yadernoy fiziki Moskovskogo gosudarstvennogo
universiteta.
(Gamma rays)

MITROFANOV, K.P.; SHPINEL', V.S.

Resonance absorption of 23.8 Kev. gamma rays by Sn¹¹⁹, as observed
from conversion electrons. Zhur.eksp.i teor.fiz. 40 no.3:983-985
(MIRA 14:8)
Mr '61.

1. Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta.
(Gamma rays) (Tin--Isotopes) (Electrons--Emission)

SHPINEL', V.S.; BRYUKHANOV, V.A.; DELYAGIN, N.N.

Temperature effect on the hyperfine structure of gamma-radiation. Zhur. eksp. i teor. fiz. 40 no.5:1525-1527 My '61.

1. Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta.

(Gamma rays) (Spectrum, Atomic)

26688
S/056/61/041/005/003/038
B104/B108

24,7480 (1055,1160,1555)

AUTHORS: Delyagin, N. N., Shpinel', V. S., Bryukhanov, V. A.

TITLE: Resonance absorption of 23.8 kev γ -quanta by Sn^{119} nuclei in crystals

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 41,
no. 5(11), 1961, 1347-1358

TEXT: The resonance absorption of 23.8-kev γ -quanta by Sn^{119} nuclei in SnO_2 , SnO , β -Sn, and SnNb_3 crystals was studied. Sn^{119m} in SnO_2 was used as gamma source. The authors derived the formula

$$\epsilon(v) = xf \left(1 - \frac{1}{\pi} \int_{-\infty}^{+\infty} \frac{\exp[-C/(1+x^2)]}{1+(x+y)^2} dx \right). \quad (5)$$

$x = \frac{E-E_0}{\Gamma/2}$, $y = \frac{E_0v/c}{\Gamma/2}$, $C = \sigma_0 f' n$.
which enables them to calculate the shape of the absorption spectrum measured by experiment. Γ is the total width of an absorption level, v the relative velocity between source and absorber, f' is the absorption

Card 1/6

26688
S/056/61/041/005/003/038
B104/B108

Resonance absorption of ...

probability of a γ -quantum without recoil, n is the number of atoms on 1 cm² of the absorber, x is a parameter determining the contribution of the investigated γ -quanta to the overall counting rate. The line width in the resonance absorption spectrum as a function of the thickness of the absorber is derived from formula (5). This formula is discussed for cases where 1) the source contains nuclei of an isotope, 2) the emission lines are split up, the absorption lines are not split, and 3) the absorption lines are split, too. Because of quadruple interaction, the

Sn^{119} ground state is not split (spin 1/2). Consequently the absorption spectrum consists of two lines of equal intensity. The distance between these two lines is

$$\Delta = \frac{1}{2} e^2 Q q_{zz} \left(1 + \frac{1}{3} \eta^2\right)^{1/2}, \text{ where } Q \text{ is the nuclear}$$

quadrupole moment, and η is a parameter of asymmetry. For a given velocity v_0 the unsplit emission line coincides with one of the two components of the split absorption line. Resonance absorption is then

$$\epsilon(v_0) = x f \left(1 - \frac{1}{\pi} \int_{-\infty}^{+\infty} \frac{\exp \left\{ -\frac{C}{2} \left(\frac{1}{1+x^2} + \frac{1}{1+(x+y)^2} \right) \right\}}{1+x^2} dx \right), \quad (11).$$

Card 2/6

26688
S/056/61/041/005/003/038
B104/B108

Resonance absorption of ...

The resonance absorption of the compounds mentioned above as a function of the velocity of the absorber relatively to the source was determined at nitrogen and room temperatures with an experimental device shown in Fig. 1. The SnO_2 source was prepared from tin enriched in the Sn^{118} isotope up to 92% and irradiated by thermal neutrons in a reactor. The absorption probability without recoil was determined from the dependence of $\epsilon(v)$ on the absorber thickness. Results are given in the table. The calculation of f' is possible if the phonon spectrum of a real crystal is known. Calculation of f' in Debye approximation is discussed. F. L. Shapiro (UFN, 72, 685, 1960), V. A. Lyubimov, A. I. Alikhanov (Izv. AN SSSR, seriya fiz., 24, 1076, 1960), K. P. Mitrofanov, V. S. Shpinel' (ZhETF, 40, 983, 1961), and Yu. M. Kagan are mentioned. The authors thank N. Ye. Alekseyevskiy for valuable discussions. There are 7 figures, 1 table, and 20 references: 7 Soviet and 13 non-Soviet. The 3 most recent references to English-language publications read as follows: W. Visscher, Ann. of Physics, 9, 194, 1960; H. J. Lipkin, Ann. of Physics, 9, 332, 1960; S. De Benedetti, G. Lang, R. Ingalls, Phys. Rev. Lett., 6, 601, 1961.

Card 3/6

26688
S/056/61/041/005/003/038
B104/B108

Resonance absorption of ...

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute of Nuclear Physics of Moscow State University)

SUBMITTED: April 27, 1961

Fig. 1. Experimental device. Legend: 1) Pulley; 2) cam; 3) contact disk of the amplitude modulation device; 4) holder for absorber; 5) source; 6) palladium filter; 7) lead collimator; 8) low temperature vessel; 9) absorber; 10) lead collimator; 11) NaI(Tl) crystal; 12) photomultiplier.

Card 4/6

S/056/61/041/006/014/054
B113/B104

AUTHORS: Shpinel', V. S., Bryukhanov, V. A., Delyagin, N. N.

TITLE: Isomeric energy shifts of the 23.8-kev γ -transition in the
 Sn^{119} nucleus

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 41,
no. 6(12), 1961, 1767-1770

TEXT: The authors measured the isomeric shifts of the 23.8-kev γ -transition in the Sn^{119} nucleus in various tin compounds. An $\text{Sn}^{119m}\text{O}_2$ preparation served as source which was kept at room temperature. The absorber consisted of various crystalline tin compounds and was kept at nitrogen or room temperature. In SnF_2 , the absorption line is split into two components due to quadrupole interaction of the excited Sn^{119} nucleus with the gradient of the electric field in the crystal. The isomeric shift δ with respect to the energy of the γ -transition in the SnO_2 crystal was determined at room temperature. There was no quadrupole splitting in the absorption spectrum of the SnCl_2 crystal. Besides in β -Sn and SnO ,

Card 1/3

S/056/61/041/006/014/054
B113/B104

Isomeric energy shifts of the ...

quadrupole splitting was only observed in SnF_2 : $\Delta = (15.5 \pm 2.5) \cdot 10^{-8}$ ev. Δ did not much depend on temperature. Measurements of energy shifts for various compounds showed that there were no distinct rules governing the isomeric shifts of the 23.8-kev γ -transition in the Sn^{119} nucleus. It may be assumed that for bivalent compounds the two p-electrons in the outer shell of the tin atom play a special role in the chemical bond; the valency electrons of the following shell, the two s-electrons, affect the chemical bond in tetravalent compounds only, and lead to a sharp change of the isomeric shift. Hence, it follows that the density of the s-electron wave function in the region of the nucleus is lower in tetravalent than in bivalent compounds. Comparing the isomeric shift of bi- and tetravalent tin compounds one may put down:

$E_{\text{II}} - E_{\text{IV}} \sim (R_{\text{exc}}^2 - R_0^2) [|\psi(0)|_{\text{II}}^2 - |\psi(0)|_{\text{IV}}^2]$, where R_{exc} and R_0 are the effective radii of the charge of the Sn^{119} nucleus in the excited and ground state, $\psi(0)$, the electron wave function in the region of the nucleus. $R_{\text{exc}}^2 > R_0^2$, i.e., the effective radius of the charge distribution grows when the Sn^{119} nucleus is excited. Since quadrupole interaction exists, the magic proton core of the Sn^{119} nucleus is not spherically

Card 2/3

Isomeric energy shifts of the ...

S/056/61/041/006/014/054
B113/B104

symmetric. There are 2 figures, 1 table, and 9 references: 5 Soviet and 4 non-Soviet. The four references to English-language publications read as follows: O. C. Kistner, A. W. Sunyar. Phys. Rev. Lett., 4, 412, 1960; S. De Benedetti, G. Lang, R. Ingalls. Phys. Rev. Lett., 6, 60, 1961; I. R. Walker, G. R. Wertheim, V. Jaccarino. Phys. Rev. Lett., 6, 98, 1961; A. J. F. Boyle, D. St. P. Bunbury, C. Edwards. Proc. Phys. Soc., 77, 1062, 1961.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute of Nuclear Physics of the Moscow State University)

SUBMITTED: July 1, 1961



Card 3/3

SHPINEL', V.S.

S/120/62/000/001/003/061
E032/E514

AUTHORS: Bryukhanov, V.A., Delyagin, N.N., Zvenglinevskiy, H.,
Sergeyev, S.A. and Shpinel', V.S.

TITLE: Measurement of the resonance absorption spectra of
gamma-rays in crystals

PERIODICAL: Pribory i tekhnika eksperimenta, no.1, 1962, 23-28

TEXT: In a previous paper (Ref.5; Zh.eksperim. i teor.fiz.,
1960, 39, 220; Ibid 40, 713) the authors described an apparatus
which was used to investigate the Mossbauer effect (23.8 kV
gamma-rays on Sn¹¹⁹ nuclei in crystals). In this apparatus the
relative velocity of the source and the absorber is varied
linearly with time with the aid of a mechanical device and the
intensity of the gamma-rays corresponding to different values of
this velocity is recorded with a multi-channel kicksorter and an
amplitude modulator working in synchronism with the device
producing the above velocity variation. In the present note the
authors give a more detailed description of the apparatus,
including both the mechanical and the electronic parts of it. A
typical absorption spectrum for a SnO₂ crystal (9 mg/cm² target
Card 1/2

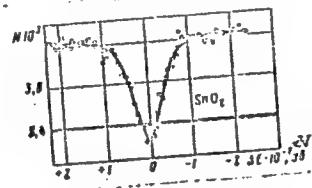
Measurement of the resonance ... S/120/62/000/001/003/061
E032/E514

and 6 mg/cm² source, both at room temperature) is shown in Fig.6¹¹⁹.
It is reported that the width of the 23.8 keV excited state of Sn¹¹⁹
is $(2.6 \pm 0.25) \times 10^{-6}$ eV. There are 6 figures.

ASSOCIATION: Institut yadernoy fiziki MGU
(Institute of Nuclear Physics MGU)

SUBMITTED: June 15, 1961

Fig.6



Card 2/2

S/188/62/000/003/001/012
B111/B112

14-30

AUTHORS: Vasilev, Ts. B., Forafontov, N. V., Shpinel', V. S.

TITLE: Study of the decay types of Ce¹⁴⁴ by the coincidence method

PERIODICAL: Moscow Universitet. Vestnik. Seriya III. Fizika, astronomiya, no. 3, 1962, 3-16

TEXT: The decay types of Ce¹⁴⁴ in an odd-odd Pr¹⁴⁴ nucleus are studied by means of a β -spectrometer and a luminescence $\beta(\gamma)$ -spectrometer in coincidence circuit, using $\beta-e^-$, e^-e^- and $e^-\gamma$ coincidences to explain certain problems. The results are in agreement with the decay scheme of I. S. Geiger et al. (Nucl. Phys., 16, 1, 1960). The $\beta-e^-$ and e^-e^- coincidence measurements were performed both upon all electrons (total coincidences) and upon individual electron groups separated by a differential discriminator. The variants of the decay scheme can be examined by comparing the intensity of the conversion lines in the coincidence spectrum. The results from measuring $\beta-e^-$ and e^-e^- coincidences are summarized in Fig. 1 and Fig. 2, those of $\gamma-e^-$ and $e^-\gamma$ coincidences in Fig. 4 and Fig. 5, discussed in detail for the individual coincidences in Fig. 6 and Fig. 7. JA

Card 1/6 Z

SHPINEL', V.S. (Moskva)

The Mössbauer effect and its application. Izv. AN SSSR. Otd.
tekhn. nauk. Energ. i avtom. no.4:71-82 Jl-Ag '62. (MIRA 15:8)
(Gamma rays) (Nuclear magnetic resonance and relaxation)

BRYUKHANOV, V.A.; DEYAGIN, N.N.; ZVENGLINSKIY, B.; SERGEYEV, S.A.; SHPINEL',
V.S.

Measuring spectra of gamma-ray quanta resonance absorption in
crystals. Prib.i tekhn.eksp. 7 no.1:23-28 Ja-F '62. (MIRA 15:3)

1. Institut yadernay fiziki Moskovskogo gosudarstvennogo universiteta.
(Gamma-ray spectrometry)

KHYUKOVA, L. N.; MURAV'YEVA, V. V.; SHPINEL', V. S.; MALYSHEVA, T. V.;
KHOTIN, V. A.

Level scheme of Ir¹⁸⁹ excited by electron capture in Pt¹⁸⁹.
Izv. AN SSSR. Ser. fiz. 16 no.12:1492-1494 D '62.
(MIRA 16:1)

1. Nauchno-issledovatel'skiy institut yadernoy fiziki
Moskovskogo gosudarstvennogo universiteta im. M. V. Lomonosova
i Institut geokhimii i analiticheskoy khimii im. Vernadskogo
AN SSSR.

(Iridium—Isotopes) (Platinum—Isotopes)
(Electrons—Capture)

KRYUKOVA, L. N.; MURAV'YEVA, V. V.; FORAFONTOV, N. V.; SHPINEL', V. S.

Study of $e^- \gamma$ -coincidence in Pt¹⁸⁸ decay. Izv. AN SSSR. Ser.
fiz. 16 no.12:1521-1522 D '62. (MIRA 16:1)

1. Nauchno-issledovatel'skiy fizicheskiy institut Leningradskogo
gosudarstvennogo universiteta im. A. A. Zhdanova.

(Platinum-Decay) (Spectrometry)

S/048/62/026/002/016/032
B106/B108

AUTHORS: Strigachev, A. T., Sorokin, A. A., and Shpinel', V. S.

TITLE: Study of the terbium fraction

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya,
v. 26, no. 2, 1962, 252-258

TEXT: The terbium fraction, isolated radiochemically from a tantalum target after 660-Mev proton bombardment in the synchrocyclotron of the OIYAI was studied with a β -spectrometer БПП (BPP) (double-focusing) by the method of $\gamma\gamma$ -coincidences. The radiation source and the measuring device have been described before (Izv. AN SSSR. Ser. fiz., 25, no. 7, 813 (1961)). The spectrum of the conversion electrons of the Tb fraction was measured with a resolution of 1-2% in the range of 10-100 kev, and with 0.4% dissolution in the range of 530-3000 kev. (Tables 1, 2). The K and L lines of the γ -transition with 108.3 kev were used to graduate the spectrometer in the range of 10-100 kev. The spectrum of the Tb fraction was investigated up to conversion electron energies of ~ 3 Mev. Above 1 Mev, however, no conversion lines could be observed. The spectrometer ✓

Card 1/6 3

Study of the terbium fraction

S/048/62/026/002/016/032
B106/B108

state $f_{7/2}$ in a paper by N. M. Anton'yeva et al. (Izv. AN SSSR. Ser. fiz., 22, no. 2, 135 (1958)). Possibly the first excited level with 108.3 kev is of the $h_{9/2}$ type. This assumption does not contradict to the multipolarity $M1 + E2$ of the 108.3 kev γ -transition. The authors thank the team of the LYaP OIYAI under supervision of V. A. Khalkin for separating the Tb fraction, and K. Ya. Gromov and I. A. Yutlandov for assistance. There are 5 figures, 3 tables, and 10 references: 5 Soviet and 5 non-Soviet. The three most recent references to English-language publications read as follows: Toth K. S., Bjørnholm S., Jørgensen M. H., Nielsen O. B., Skilbreid O., Svanheden A., J. Inorg. and Nucl. Chem., 14, 1/2, 1 (1960); Toth K. S., Nielsen O. B., Skilbreid O., Nucl. Phys., 19, No. 4, 389 (1960); Toth K. S., Bjørnholm S., Jørgensen M. H., Nielsen O. B., Skilbreid O., Phys. Rev., 116, 1, 118 (1959).

ASSOCIATION: Nauchno-issledovatel'skiy institut yadernoy fiziki Moskovskogo gos. universiteta im. M. V. Lomonosova (Scientific Research Institute of Nuclear Physics of Moscow State University imeni M. V. Lomonosov). Ob'yedinennyi institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

Card 3/6 3

BRYUKHANOV, V.A.; COL'DANSKIY, V.I.; DELYAGIN, N.N.; MAKAROV, Ye.F.;
SHPINEL', V.S.

Observation of the Mössbauer effect in a tin-containing polymer.
Zhur. eksp. i teor. fiz. 42 no.2:637-639 F '62. (MIRA 15:2)

1. Institut khimicheskoy fiziki AN SSSR i Institut yadernoy fiziki
Moskovskogo gosudarstvennogo universiteta.
(Polymers)(Gamma-ray spectrometry)

S/056/62/042/003/008/049
B104/B102

AUTHORS: Fam Zuy Khuyen, Shapiro, V. G., Shpinel', V. S.

TITLE: Resonance scattering of γ -quanta in Te¹²⁵

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42,
no. 3, 1962, 703 - 706

TEXT: The resonance of 35.5-kev γ -rays emitted from Te^{125m} was studied. Te^{125m} was obtained from neutron-bombarded metallic tellurium enriched in Te¹²⁴ up to 86%. The TeO₂ obtained was used to produce sources of 20 mg/cm² thickness. A TeO₂ layer enriched in Te¹²⁵ to 92% and applied onto an aluminum base served as scatterer. A luminescence spectrometer recorded the X-radiation from the scatterer. This radiation contained also resonance-scattered γ -quanta and the non-resonance-scattered radiation from the scatterer, the base, the shield, etc. The pulses from the photomultiplier (Fig. 2) were fed into two scaling circuits over an amplifier and a single-channel discriminator. One of these circuits

Card 1/3

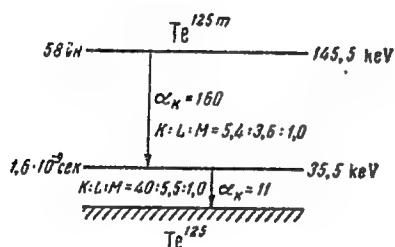
Resonance scattering of...

Fig. 1. Te^{125m} decay scheme.

Fig. 2. Experimental arrangement.

Legend: (1) Source; (2) scatterer, in an NaI(Tl) detector crystal, (3); (4) lead collimator; (5) lead plate; (6) background filter; (7) black paper.

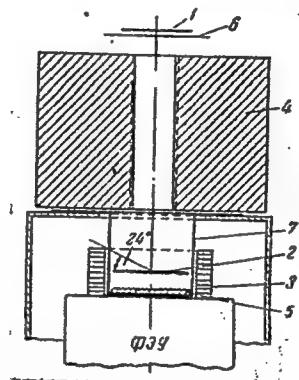
Fig. 1



Card 3/3

S/056/62/042/003/008/049
B104/B102

Fig. 2



Magnetic moment of the...

S/056/62/042/005/007/050
B125/B108

$\mu H = 2.02 \pm 0.07$ mm/sec ($\mu_0 = -1.041$ of the nuclear magneton, μ_0 and μ denote the magnetic moments of the ground state and of the excited state of the Sn¹¹⁹ nucleus, respectively, H is the mean field strength). The isomeric shift of the absorption line in the alloy is $+1.36 \pm 0.04$ mm/sec. The magnetic field acting upon the tin nuclei in the alloy is 68 ± 2 koe. This internal magnetic field depends on the composition of the alloy. There are 1 figure and 1 table. The most important English-language reference is: O. C. Kistner, A. W. Sunyar, T. B. Swan. Phys. Rev., 123, 179, 1961.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute of Nuclear Physics of Moscow State University)

SUBMITTED: December 15, 1961

Card 2/2

3/356/13/043/002/011/055
3102/E104

Some characteristics of the spectra...

shift in tetravalent tin compounds increases from SnO_2 to SnI_4 with decreasing electro-negativity of the element (sequence: F, O, Cl, Br, S, I). (2) The isomer shift of the bivalent compounds is much larger than that of the tetravalent ones. (3) A quadrupole line splitting was only observed with the bivalent tin compounds. (4) The quadrupole interaction decreases with decreasing electro-negativity of the element connected with the tin. The following compounds were investigated: CaSnO_3 , SrSnO_3 , BaSnO_3 , SnO_2 , SnS_2 , SnO , $(\text{H}_2\text{O})_2\text{SnCl}_6$, SnF_2 , $\beta\text{-Sn}$, $\text{SnCl}_4 \cdot 5 \text{H}_2\text{O}$, $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$, SnI_4 , SnBr_2 , and $\text{Sn}(\text{C}_6\text{H}_5)_4$. The gamma-quantum absorption probability ratios $f'(77^\circ\text{K})/f'(300^\circ\text{K})$ were as follows (same sequence): ~1, ~1, ~1, 1.25, 2.8, 2.9, 5.7, 8.5, 6.0, 26, -, -, -, -. The interpretation of the results confirms the assumption that the Sn^{110} nuclear excitation raises the effective radius of the charge distribution (ZhETF, 41, 1767, 1961). There are 2 figures and 3 tables.

ASSOCIATION: Institut Yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute of Nuclear Physics of the Moscow State University)

SUBMITTED: March 15, 1962
Card 2/2

S/048/62/026/012/008/016
B117/B186

AUTHORS: Kryukova, L. N.; Murav'yeva, V. V., Shpinel', V. S.,
Malysheva, T. V., and Khotin, V. A.

TITLE: Scheme of levels of Ir¹⁸⁹ excited on electron capture in Pt¹⁸⁹

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26,
no. 12, 1962, 1492 - 1494

TEXT: The decay of the neutron-deficient isotope Pt¹⁸⁹, $T_{1/2} = 10.5$ hrs,
was studied by analyzing the conversion spectrum of the platinum fraction.
In the 30 - 650 kev range, the measurements were made with a magnetic
spiral spectrometer using a method and experimental conditions described
earlier (Izv. AN SSSR. Ser. fiz., 24, 1109 (1960); 25, 1257 (1961)).
Besides the lines found previously, two new ones were discovered: 381 kev,
 $T_{1/2}$ - several hours, K457.1 and 644.5 kev, $T_{1/2} = 10 \pm 1$ hr, K720.6. The
energies of the γ -transitions in Ir¹⁸⁹ were measured and their multipole
orders estimated (Tab. 2). Proceeding from the similarity of the odd
isotopes Ir¹⁹¹ and Ir¹⁹³, a level scheme was proposed on the basis of the

Card 1/4

Scheme of levels of...

S/048/62/026/012/008/016
B117/B186

ASSOCIATION: Nauchno-issledovatel'skiy institut yadernoy fiziki Moskovskogo gos. universiteta im. M. V. Lomonosova (Scientific Research Institute of Nuclear Physics of the Moscow State University imeni M. V. Lomonosov); Institut geokhimii i analiticheskoy khimii im. Vernadskogo Akademii nauk SSSR (Institute of Geochemistry and Analytical Chemistry imeni Vernadskiy of the Academy of Sciences USSR)

Fig. 1. Energy level diagram of Ir¹⁸⁹.

Table 2. Energy and multipole order of the γ -transitions in Ir¹⁸⁹.

Legend: (1) Possible values of the multipole orders; (2) small admixtures.

Card 3/4

e⁻γ-coincidences in ...

S/048/62/026/012/014/016
B117/B102

cascade between 140 and 280 kev. The analysis of coincidence and non-coincidence γ-spectra of Pt¹⁸⁸ served to determine relative intensities of the γ-lines. Comparison between the γ-intensities and the intensities of the conversion lines resulted in the following ratio of K-shell conversion coefficients: α_{K140}:α_{K187}:α_{K195}:α_{K280}:α_{L380}:α_{K410}:α_{K470} = 0.5:1:1:(≤0.1):(≤0.03):(≤0.03):(≤0.05). This paper was presented at the 12th Annual Conference on Nuclear Spectroscopy in Leningrad from January 26 to February 2, 1962. There are 2 figures and 1 table.

ASSOCIATION: Nauchno-issledovatel'skiy institut yadernoy fiziki Moskovskogo gos. universiteta im. M. V. Lomonosova (Scientific Research Institute of Nuclear Physics of the Moscow State University imeni M. V. Lomonosov)

Card 2/2

BRYUKHANOV, V.A.; DELYAGIN, N.N.; SHPINEL', V.S.

Magnetic moment of the excited state of the Sn¹¹⁹ nucleus at
an energy of 23.8 Kev. Zhur. eksp. i teor. fiz. 42 no.5:
1183-1185 My '62. (MIRA 15:9)

1. Institut yadernoy fiziki Moskovskogo gosudarstvennogo
universiteta.

(Tin—Magnetic properties) (Quantum theory)

SPINEL, V.S.

2

S/050/62/043/002/015/055
B102/B104

ASTRONOMY: Bryukhanov, V. A., Gol'danskiy, V. I., Delyagin, N. N.,
Kozai, L. A., Makarov, Ye. P., Sazalev, I. P., Shvidkaya, E.

peculiarities of Mossbauer spectra of organo-tin compounds and the role of the nearest chemical bond in the Mossbauer effect

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43,
no. 2(c), 1962, 446-452

periodicals: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43,
no. 2(c), 1962, 446-452

TEMP: In continuation of their studies on the Mössbauer effect in organo-tin compounds (ZMBTF, 42, 637, 1962), the authors determined a Mössbauer effect in the resonance absorption of 23.8-kev gamma-quanta by Sn^{119} nuclei. Many examples, e.g. $\text{Sn}(\text{C}_6\text{H}_5)_4$, SnCl_4 on the one hand, and $\text{Sn}(\text{C}_6\text{H}_5)_4\text{Cl}_{4-i}$ ($i=1,2,3$) on the other, show that in compounds with four identical substituted groups the Mössbauer lines appear as the usual singlet, whereas with different substituted groups ($R_i\text{SnX}_{4-i}$) a distinct doublet occurs. The two lines differ in width and intensity, depending
SAPL 1/2

Peculiarities of Mossbauer spectra...

S/055/62/043/J02/015/053
3102/3104

on the ratio of R to K. In amorphous media, e.g. in stanniferous glass, the Mossbauer effect was observed for the first time. The glass composition was the following: SnO_2 -9.1%; SiO_2 -61.5%; B_2O_3 -18.5%; Al_2O_3 -3.2%; Na_2O -7.9%. The spectra of crystalline $\text{Sn}(\text{C}_6\text{H}_5)_4$ and its solid solution in polymethylmethacrylate and of crystalline $\text{Sn}(\text{C}_6\text{H}_5)_2\text{Cl}_2$ and of its 20% solution in dichloroethane are identical. Some of the data obtained indicate that the decisive factor determining the shape of the Mossbauer spectra (isomer shift and quadrupole splitting) are the molecular bonds closest to the tin nucleus. There are 3 figures and 1 table.

ASSOCIATION: Institut Khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences USSR)

SUBMITTED: April 12, 1962

Cart: 2/2

S/056/62/043/003/009/063
B125/B102

AUTHORS: Alekseyevskiy, N. Ye., Fam Zuy Kiyan, Shapiro, V. G.,
Shpinel', V. S.

TITLE: Anisotropy of the Mössbauer effect in a β -Sn single crystal

PERIODICAL: Zhurnal experimental'noy i teoreticheskoy fiziki, v. 43,
no. 3(9), 1962, 790 - 794

TEXT: The resonance absorption probability f' of 23.8 kev γ -quanta in white tin was studied at 77°K and 293°K. The lamellar absorbers, about 57.5 mg/cm² thick, were cut out from β -Sn single crystals in the (001), (101) and (100) planes. The trial measurements were made with a polycrystalline tin foil. The γ -quantum sources, consisting of Sn^{119m} nuclei in SnO₂ (88% Sn¹¹⁸; ~5 mg/cm² thick), were irradiated in a reactor. In all experiments the source was kept at room temperature. The figure shows three spectra taken at 77°K under identical geometrical conditions. Probably because of quadrupole interaction, the half-widths of the lines observed are greater than the theoretical half-widths if allowance is

Card 1/3

S/056/62/043/003/009/063
B125/B102

Anisotropy of the Mössbauer...

made for the effective thicknesses of absorber and source. The gradient of the electric field in β -Sn crystals is axisymmetrical in first approximation, the axis of symmetry being perpendicular to the (001) plane. The components of the absorption spectrum for the (001), (101) and (100) planes have the relative intensities $a = 3$, $a = 9/7$ and $a = 3/5$, $a = \frac{w_{+3/2}}{w_{+1/2}}$; $w_{+3/2} \sim (1 + \cos^2 \theta)$, $w_{+1/2} \sim ((5/3) - \cos^2 \theta)$. w_{+J_2} is the resonance absorption

probability of the γ -quanta to the corresponding sublevel. θ is the angle between the symmetry axis of the crystal and the direction of the incident γ -quantum. The greater the quadrupole splitting and the smaller the effective absorber thickness, the greater the shift of the absorption maximum towards the more intense component and the asymmetry of the line. The resonance absorption probabilities at 77°K are $f'_{100}:f'_{001}:f'_{\text{polycryst}} = 1:0.67:0.89$, at 293°K, $f'_{100}:f'_{101}:f'_{001}:f'_{\text{poly}} = 1:0.95:0.75:0.80$. There are 1 figure and 3 tables.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute of Nuclear Physics of the Moscow State University)

Card 2/3

S/056/62/043/004/018/061
B102/B180

AUTHORS: Aleksandrov, A. Yu., Delyagin, N. N., Mitrofanov, K. P.,
Polak, L. S., Shipinol', V. S.

TITLE: Quadrupole interaction and isomeric shifts of 23.8-kev gamma transition of Sn^{119} nucleus in organo-tin compounds

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43,
no. 4(10), 1962, 1242 - 1247

THAT: In continuation of earlier studies (ZhETF, 42, 637, 1962; 43, 448, 1962) on the Mössbauer resonance absorption spectra of 23.8-kev γ -quanta by Sn^{119} , this work deals with the effect of substituting certain atomic groups in organic compounds of the $(\text{C}_4\text{H}_9)_2\text{SnX}_n$ type, and SnX_4 by others on the isomeric shift S , and the quadrupole interaction; X is an element or a group of atoms, $n = 1, 2$. The resonance absorption spectra were recorded with a) an absorber whose velocity was varied linearly with time and b) one of constant velocity, the thicknesses varying from 30 - 100 mg/cm². The latter method yielded more accurate spectra since the device used had

Card 1/A2

Quadrupole interaction ...

S/056/62/043/004/018/061
B102/B180

Selective sensitivity to 23.8-kev γ -quanta. 5 mg/cm² SnO₂ containing Sn^{113m} was used as a γ -quantum source. The organo-tin compounds investigated had no impurities which affected the shape of the spectrum. In all measurements the source was kept at room temperature and the absorber at liquid-nitrogen temperature. The values obtained for δ and for the quadrupole splitting constant Δ vary regularly for the compounds for which the electronegativity of the A atoms varies. Double bonds, and also atoms with high electronegativity not directly bonded with the tin atoms, were found to exert a strong effect on the electric field strength acting on the tin nucleus. This can be qualitatively explained by the molecular structure. There are 3 figures and 1 table.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute of Nuclear Physics of Moscow State University). Institut neftekhimicheskogo sinteza Akademii nauk SSSR (Institute of Petrochemical Synthesis of the Academy of Sciences USSR)

REF. ITP-10: May 16, 1962
Card 2/12

S/056/62/043/006/016/067
B102/B104

AUTHORS: Sorokin, A. A., Shtal', M. Z., Shpinel', V. S.

TITLE:

The Zr⁹⁷ decay scheme

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43,
no. 6(12), 1962, 2056-2062

TEXT: It has been found previously (Ref. 1. Izv. AN SSSR, seriya fiz., 20,
913, 1956) that in the Zr⁹⁷ decay, besides the 745-kev isomeric state
($T_{1/2} = 60$ sec) of Nb⁹⁷, several higher levels are excited with intensities
 $\leq 10\%$ (cf. Ref. 2. Nucl. Phys., 1, 499, 1956). The values obtained in Refs
1 and 2 for transitions excited in the Zr⁹⁷ decay coincide, those excited
in the Nb⁹⁷ decay do not agree but energy and intensity of the γ -lines
agree with each other. In order to explain these facts, the Zr⁹⁷ decay
was studied in detail. The spectra of the γ -lines and of the $\gamma\gamma$ coincidences
arising in the decay $Zr^{97} \rightarrow Nb^{97} \rightarrow Mo^{97}$ were measured with a coincidence
Card 1/3

S/056/62/043/006/016/067
B102/B104

The Zr⁹⁷ decay scheme

scintillation spectrometer and a NaI(Tl)-crystal spectrometer with $\phi\gamma$ -24 (FEU-24) photomultiplier and a AI-100 (AI-100) 100-channel pulse-height analyzer. The γ -lines 1.12 Mev (Zn⁶⁵) 2.62 Mev (Te²⁰⁸) and 2.76 Mev (Na²⁴) served as standards. The above-mentioned higher levels were found to be at 1.15, 1.35, 1.75, 1.84, and 2.1 Mev. The suggested

Zr⁹⁷-Nb⁹⁷ decay scheme is shown in Fig. 5. Its characteristics are discussed in detail. The characteristics of the 1.15 and 1.35 Mev levels could not be determined. The absence of transitions from them to the 0.745-Mev level indicates spins of above 3/2. The decay scheme suggested eliminates the contradictions that arose between Ref. 1 and Ref. 2. There are 5 figures and 1 table.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute of Nuclear Physics of Moscow State University)

SUBMITTED: July 18, 1962

Card 2/3

S/056/62/043/006/018/067
B102/B104

AUTHORS:

Aleksandrov, A. Yu., Delyagin, N. N., Mitrofanov, K. P.,
Polak, L. S., Shpinel', V. S.

TITLE:

Influence of gamma irradiation on the shape of Mössbauer resonance absorption spectra of organo-tin compounds

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43,
no. 6(12), 1962, 2074 - 2076

TEXT: The spectra of Mössbauer resonance absorption of 23.8-kev gamma quanta by Sn¹¹⁹ in organo-tin compounds depends on the valency of the absorbing atom, on the molecular structure and on peculiarities of the bonds of the tin atom (ZhETF, 43, 448, 1962; 43, 1242, 1962). This dependence could be used to draw conclusions on irradiation-induced changes of a material from changes in the Mössbauer resonance absorption characteristics. In order to study these possibilities, the Mössbauer resonance absorption spectra of (C₄H₉)₂SnSO₄ (I) and [(C₄H₉)₂Sn(OCOCCH₃)₂]_n, irradiated at 25-35°C by Co⁶⁰ γ -rays with doses between 4·10²⁰ and 3·10²² ev/cm³ were

Card 1/3

S/056/62/043/006/018/067
B102/B104

Influence of gamma ...

investigated. The spectrum of non-irradiated I shows a symmetric doublet, the peaks corresponding to the velocities -0.6 and +4.2 mm/sec. Irradiation with maximum dose led to a distinct change in the spectrum: two lines with an intensity ratio 1:3 arose, corresponding to the velocities -0.3 mm/sec and 4 mm/sec. indicating a disintegration of I into C_4H_9 and O_3 . In a few cases only one oxygen atom was split off from I. On $SnSO_4$. In a few cases only one oxygen atom was split off from I. On irradiating I in the presence of oxygen only one line appeared, its peak corresponding to zero velocity. This spectrum is interpreted as due to the presence of SnO_2 or a similar oxide formed in oxidation by O_3 produced on irradiation. The spectrum of the polymer irradiated with a dose of 11.2 Mr shows two lines of almost equal width and intensity at -0.15 and 2.85 mm/sec. When the dose is increased to 160 Mr both lines broaden, the latter doing so more rapidly but reducing its height at the same time. When the dose has reached 250 Mr, the line at -0.15 mm/sec has remained almost unchanged (width 1.5 mm/sec) but the 2.85-mm/sec line shows a splitting into several flat poorly resolved components. This asymmetry can be explained by assuming an intramolecular magnetic field whose energy of Card 2/3

Influence of gamma ...

S/056/62/043/006/018/067
B102/B104

interaction with the Sn¹¹⁹ nucleus is weaker than that of quadrupole interaction. It cannot be attributed to any certain chemical structure. There is 1 figure.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute of Nuclear Physics of Moscow State University); Institut neftekhimicheskogo sinteza Akademii nauk SSSR (Institute of Petrochemical Synthesis of the Academy of Sciences USSR)

SUBMITTED: July 20, 1962

Card 3/3

L 10984-63

EWT(m)/BDS--AFFTC/ASD--AR

ACCESSION NR: AP3002718

S/0120/63/000/003/0049/0054 55

AUTHOR: Mitrofanov, K. P.; Illarionova, N. V.; Shpinel', V. S.

54

TITLE: Counter with selective efficiency for registering recoilless Gamma radiation 19

SOURCE: Pribory i tekhnika eksperimenta, no. 3, 1963, 49-54

TOPIC TAGS: Gamma radiation, Gamma radiation counter, resonant absorption, internal conversion electrons, Mossbauer effect

ABSTRACT: A radiation detector with selective response to recoilless Gamma radiation is described. Its operating principle is based on registering the internal conversion electrons which emerge as a result of Gamma radiation and which have a mean free path comparable to that of the latter. This is the case for compounds of tin such as SnO₂, for which the probability of resonant absorption of Gamma rays is high. A working model of such a "resonant" counter

Card 1/2

L 10384-63
ACCESSION NR: AP3002718

contained two flat plexiglass disks covered with 0.01-mm copper foil and a surface layer of SnO sub 2 enriched to 7% with the isotope Sn sup 119. The disks were 40 mm in diameter and spaced 5 mm apart; in this intervening space three tungsten wires were located, to which various combinations of voltage were applied. Test curves from two counter configurations are shown: in one, the source was moved with some velocity with respect to the counter, and in the second, the source and counter were stationary but an intermediate absorber element was caused to move. Results show the increased sensitivity of the resonant method over the usual scintillation counter; e.g., the former's insensitivity to x-rays obviates the need for a lead shield, giving a resultant increase in Gamma-ray sensitivity of 30--50%. Orig. art. has: 6 formulas and 6 figures.

ASSOCIATION: Nauchno-issledovatel'skiy institut yadernoy fiziki MGU (Scientific Research Institute of Nuclear Physics MGU)

SUBMITTED: 31Mar62 DATE ACQ: 12Jul63 ENCL: 00

SUB CODE: 00 NO REF Sov: 003 OTHER: 003

Card 2/2 ph/42

GROMOV, K.Ya.; DANAGULYAN, A.S.; STRIGACHEV, A.T.; SHPINEL', V.S.

Isomeric state of Nd¹³⁹. Izv. AN SSSR. Ser. fiz. 27 no.10;
1357-1359 O '63. (MIRA 16:10)

S/056/63/044/002/001/065
B102/B166

AUTHORS: Fam Zui Khuen, Shpinel', V. S.

TITLE: Dependence of the γ -quantum resonance-absorption spectrum on lattice temperature

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44, no. 2, 1963, 393-397

TEXT: The authors investigated the resonance-absorption spectra of 23.8-kev γ -quanta from Sn¹¹⁹ in polycrystalline SnO₂ powder at different temperatures in the range 78-645°K. The source (thickness 8 mg/cm²) was always kept at 78°K and only the absorber temperature was altered, as was its thickness. In all cases the spectrum consisted of a single non-split peak, whose half-width Γ_{obs} ($\Gamma_{\text{obs}} > \Gamma_{\text{true}}$) was measured in relation to the absorber thickness d at 78, 293, 495, and 645°K. The straight lines obtained were extrapolated to zero thicknesses, thus yielding the value of Γ_{extr} . The line $\Gamma_{\text{true}}(d)$ calculated for room temperature intersects with

Card 1/3

S/056/63/044/002/001/065
B102/B186

Dependence of the γ -quantum ...

the extrapolated measured lines for 78 and 293°K at zero thickness. The maximum absorption $\varepsilon_0 = [N(\infty) - N(0)]/N(\infty)$ was also measured as a function of d at room temperature. From these measurements the absorption probability f' (without recoil) was determined. First, the case is considered that line broadening is caused by the doublet structure of emission and absorption lines with the distances Δ_S and Δ_A between their components. These distances were calculated from integrating Γ_{extr} . Also the dependence of ε_0 on the effective absorber thickness $C_A = n\sigma f'$ was calculated for various Δ_A . This curve calculated for $\Delta_A = 3.2$ coincides with the experimental one for $f' = 0.50$ and $\alpha f = 0.42$; αf denotes the fraction of the total counting rate which is due to γ -quantum emission without recoil. The values of f' obtained by this method are denoted by f'_I . When splitting is taken into account, the $\varepsilon_0(d)$ curve obtained does not correspond with the measured one. Then the case is considered of emission and absorption lines being broadened, their Lorentz shape however, being retained. The Lorentz widths are $\Gamma_S, \Gamma_A > \Gamma_{\text{true}}$. In this case the

Card 2/3

Dependence of the γ -quantum ...

S/056/63/044/002/001/065
B102/B166

results (f''_{II} and $\beta_A = \bar{f}_A/f_{true}$) closely with the experiments. The line shift with temperature, observed at $T \lesssim 300^{\circ}\text{K}$, is weakly nonlinear; at $T \gtrsim 300^{\circ}\text{K}$ it is linear. This shift is attributed to a second-order Doppler effect. Results:

$T, ^{\circ}\text{K}$	$\bar{f}_{extr}, \text{mm/sec}$	Δ_A	f'_I	f''_{II}	β_A
78	1,29	3,2	0,62	0,70	2,1
293	1,30	3,3	0,50	0,56	2,1
495	1,43	4,1	0,42	0,50	2,5
645	1,53	4,5	0,35	0,43	2,8

There are 3 figures and 1 table.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute of Nuclear Physics of the Moscow State University)

SUBMITTED: June 8, 1962 (initially), October 1, 1962 (after revision)
Card 3/3

L-13643-63 FCS(f)/EWP(q)/EWT(m)/BDS AFFTC/ASD JD
ACCESSION NR: A'3003117 S/0056/63/044/006/1889/1895 67

AUTHOR: Fam Zui Khiyen; Shpinel', V. S.; Viskov, A. S.; Venevtsev, Yu. N. 59

TITLE: Resonance absorption of Gamma quanta in barium, strontium, and calcium stannates 21 21 21

SOURCE: Zhurnal eksper. i teor. fiziki, v. 44, no. 6, 1963, 1889-1895

TOPIC TAGS: resonance absorption of photons, recoilless absorption, barium stannate, strontium stannate, calcium stannate, dielectric properties

ABSTRACT: The parameters of resonance absorption of the 23.8-keV Gamma quanta emitted by Sn^{119*} were measured over the temperature range from 78 to 1020 °K for the stannates of barium, strontium, and calcium, which all have a perovskite structure. This is a continuation of a similar investigation made on tin oxide (ZhETF v. 44, 393, 1963), and is aimed at checking the possible difference in the distribution of internal fields in the stannates and in the perovskite ferro- and antiferroelectrics, for which purpose study of the gamma-ray resonance absorption properties yields independent information on the field gradients and position of the tin ions. The temperature dependences of the probability for recoilless absorption and of the position of the resonance were

Card 1/2

L 13643-63

ACCESSION NR: AP3003117

studied. All compounds displayed a similar characteristic variation of the width with the temperature. The temperature variation of the unit cell size of barium and strontium stannate was studied in the temperature intervals 293 - 893 and 293 - 843 °K, respectively. The effects of atomic-mass and parameter differences of the unit cell on the measured quantities are discussed, as well as a possible mechanism for the change in the width and shape of the absorption spectrum, with the nonmonotonic variation of the width with temperature being attributable to a definite relation between the nondiagonal and diagonal elements of the dynamic quadrupole interaction. "The authors express their gratitude to Prof. G. S. Zhdanov and to G. A. Bykov, for participating in the formulation of the problem and for a discussion of the results, and to V. N. Lyubimov for interest in the work. Orig. art. has: 5 figures and 1 formula.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University); Fizikokhimicheskiy institut im. L. Ya. Karpova (Physicochemical Institute)

SUBMITTED: 27Feb63 DATE ACQ: 23Jul63 ENCL: 00
SUB CODE: 00 NO REF Sov: 015 OTHER: 006

Card 2/2

L 13847-63 FCS(f)/BDS JXT(IJP)
ACCESSION NR: AP3003156

8/0056/63/044/006/2182/2183 53

AUTHOR: Fam'zui Khiyen; Viskov, A. S.; Shpinel', V. S.; Venevtsev, Yu. N. 53

TITLE: Abrupt change in probability of the Mossbauer effect at the phase transition in ferroelectrics

SOURCE: Zhurnal eksper. i teor. fiziki, v. 44, no. 6, 1963, 2182-2183

TOPIC TAGS: Mossbauer effect, phase transitions in ferroelectrics, first order transition, resonance gamma-ray absorption, anomalous changes

ABSTRACT: An attempt was made to detect anomalous changes of the parameters for resonance gamma-ray absorption (such as probability of recoilless resonance absorption or shift of resonance energy) accompanying a ferroelectric phase transition in the series of solid solutions of bismuth ferrite in strontium stannate. The Sn^{119*} contained in tin oxide was used as a source. An abrupt change in the probability for recoilless resonance absorption (f') was observed and was attributed to the transition of the solid solution from the paraelectric to the ferroelectric state; this was confirmed by x-ray photographs. The widths of the transition regions reach sizeable values and increase with the strontium stannate content. The phenomenon is explained from the thermodynamic point of view as being due to a discontinuous decrease in the part of the internal
Card 1/2

L 13847-63
ACCESSION NR: AP3003156

2
energy associated with the thermal motion of the lattic. Orig. art. has: 2
figures and 1 formula.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta,
Fiziko-khimicheskiy institut im. L. Ya. Karpova (Institute of Nuclear Physics of
Moscow State University Physicochemical Institute)

SUBMITTED: 28May63 DATE ACQ: 23Jul63 ENCL: 00
SUB CODE: 00 NO REF Sov: 004 OTHER: 000

Card 2/2

S/020/63/148/001/027/032
B101/B186

AUTHORS: Aleksandrov, A. Yu., Delyagin, N.N., Mitrofanov, K.P.,
Polak, L.S., Shpinel', V.S.

TITLE: Investigation of organo-tin compounds by Mössbauer resonance
absorption of gamma quanta

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 148, no. 1, 1963, 126-128

TEXT: The 23.8 kev gamma absorption spectra by Sn^{119} nuclei were investigated for 22 organo-tin compounds. $\text{Sn}^{119}\text{Mo}_2$ was used as gamma source, and the absorbers were cooled to nitrogen temperature. The isomeric shift δ and the amount Δ of the quadrupole splitting were measured. Results: (1) In the compounds SnR_4 , where $R = \text{C}_2\text{H}_5, \text{C}_6\text{H}_5,$ $\text{C}_3\text{H}_7, \text{C}_4\text{H}_9,$ or $\text{CH}_2\text{CH}_2\text{CN}, \delta$ was $\sim 1.3 \text{ mm/sec}$, corresponding to the electron density caused by 4 Sn-C bonds on the Sn nucleus. The atoms not bound to Sn had no effect on δ . (2) In the compounds $(\text{C}_4\text{H}_9)_2(\text{C}_n\text{H}_{2n+1}\text{COO})_2$, $n = 1, 7, \text{ or } 17, \delta$ was $1.45 \pm 0.10 \text{ mm/sec}$, and Δ was $3.45 \pm 0.20 \text{ mm/sec}$.

Card 1/3

Investigation of organo-tin compounds ...

S/020/63/148/001/027/032
B101/B186

had no effect on the electron distribution in the Sn-O bond. (3) The highly electronegative chlorine affected δ , even if it was not bound to Sn. Data found for $(C_4H_9)_2Sn(CH_2ClCOO)_2$: $\delta = 1.60 \pm 0.10$, $\Delta = 3.65 \pm 0.10$, and for $(C_4H_9)_2Sn(CCl_3COOH)_2$: $\delta = 1.65 \pm 0.10$, $\Delta = 3.80 \pm 0.10$. (4) For $FSn(CH_2CH_2CN)_3$ and $(C_2H_5)_3SnOH$, the doublet formed by quadrupole interaction was found to be asymmetric. It is assumed that the quadrupole interaction is accompanied by a magnetic interaction affected by m_l . If an internal magnetic field exists in the molecule perpendicularly to the electric field the component of the quadrupole splitting is affected by whether the transition occurs from the $m = \pm 3/2$ or from the $m = \pm 1/2$ sublevel. There are 1 figure and 1 table.

ASSOCIATION: Institut neftekhimicheskogo sinteza Akademii nauk SSSR (Institute of Petrochemical Synthesis of the Academy of Sciences USSR); Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta im. M.V. Lomonosova (Institute of Nuclear Physics of the Moscow State University imeni M.V. Lomonosov)

Card 2/3